

(19) World Intellectual Property Organization  
International Bureau(43) International Publication Date  
24 January 2002 (24.01.2002)

PCT

(10) International Publication Number  
**WO 02/06616 A1**(51) International Patent Classification<sup>7</sup>: E05G 1/10, 1/14(81) Designated States (*national*): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW.

(21) International Application Number: PCT/NO01/00278

(22) International Filing Date: 29 June 2001 (29.06.2001)

(25) Filing Language: English

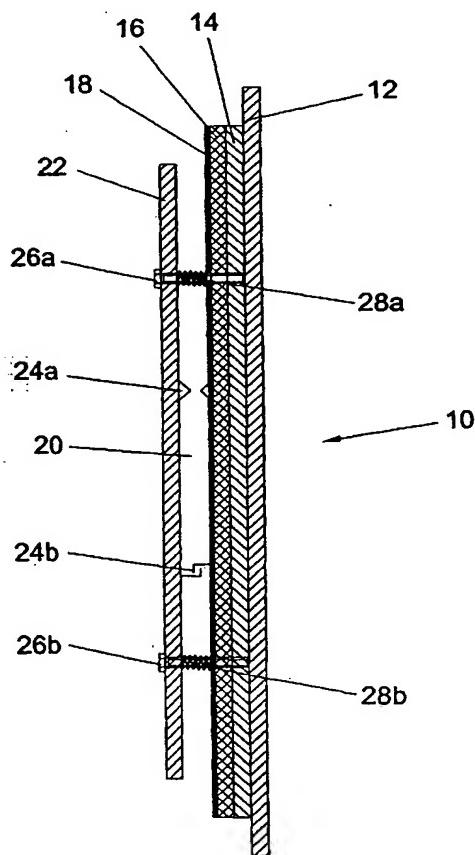
(26) Publication Language: English

(30) Priority Data:  
20003390 29 June 2000 (29.06.2000) NO

(71) Applicant and

(72) Inventor: BIRKELAND, Kjell [NO/NO]; Pb. 2  
Fjøsanger, N-5854 Bergen (NO).(74) Agent: AS BERGEN PATENTKONTOR; C. Sundtsgr.  
36, N-5004 Bergen (NO).(84) Designated States (*regional*): ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).Published:  
— with international search report*[Continued on next page]*

(54) Title: WALL CONSTRUCTION FOR STORAGE OF VALUABLES



(57) Abstract: A wall construction (10), particularly for a storage unit for valuables such as securities, is described, comprising an outer wall (12) and an inner wall (22) between which are arranged a number of layers or tiers conducting material, and contact means (24a, 24b) for activation of an electric circuit. The wall construction (10) comprises an intermediate thermal expansion mat (16) and an intermediate layer (20) comprising contact means (24a, 24b) and a sprig system (28a, 28b), which during counter-and pro influences from spring force, are arranged to counteract and to ensure about the completion or breakage of an electric circuit.

WO 02/06616 A1



*For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.*

Wall construction, particularly for storage of valuables.

The present invention relates to a wall construction, particularly for a storage box for securities, comprising  
5 an outer wall and an inner wall between which are arranged a number of layers or tiers, where one of the tiers is comprised of an electricity-conducting material, and contact means for the activation of an electric circuit.

Today it is common for storage of valuables, for  
10 example in a shop, a super-market, a kiosk or the like, to store the valuables in a safe, or that the valuables are placed in a bag to be subsequently placed in a night-safe. It is during such transportation of valuables that robbery often occurs. However, robbery occurs also with the owner  
15 or staff being forced to open the safe. This is a problem which has increased over the years, both in Norway and in many other countries, especially the USA.

From known techniques different arrangements are used for transportation of valuables. For example, NO B 162039 disclose an installation for transport of valuables which consists of a cassette which is arranged to be placed in a vehicle and a permanent station. If the cassette is removed from the cassette holder, an electronic circuit is activated, triggering an alarm for a sound signal or smoke development, colouring of the valuables, etc.

US Patent 4.852.502 disclose a safe deposit box which consists of a wall of several layers in which a conductor reacts by breaking or shortening when damage is done to the wall, and which when damaged, activates a circuit connected

to the conductor, whereby the securities in the safe deposit box are damaged or destroyed. The wall of the box is equipped with electrical reinforcement means which are galvanically separated from the circuit.

5 Furthermore, US Patent 4.942.831 disclose a container with an electrically protecting cover which surrounds a storage room. A processor unit monitors the electrical systems and, at any attempts to break open the container, activates the means which render the valuables useless.

10 The known technique which lies closest to the present invention is SE 501675 which concerns a laminated tier for use in break-in safe containers and rooms. The laminated tier consists of a fine mesh knitted or weaved mat of electricity-conducting fibres, an electricity-conducting fibre mat, an intermediate tier of an electricity isolating material and two outer tiers. The laminated tier is held together with the aid of a binder in the form of a plastic material.

15 The known solutions, and especially SE 501675, do not provide a storage unit with a wall construction that offers complete protection both against mechanical influences and thermal influences. A wall construction in a storage unit for valuables must be able to withstand external stresses in the form of attempts to, for example, cut through the 20 construction with the aid of a cutting torch, saw off one or more of the sides, i.e. the wall constructions, to 25 remove or get access to, for example, an inner container which contains the valuables.

With the present invention it is not possible to 30 remove one of the walls in such a storage box for valuables without an electric circuit activating a mechanism which destroys the valuables or which makes the banknotes use- 35 less. Correspondingly, it will not be possible to use a cutting torch or the like to make an opening in the wall construction without the electronic circuit being activated.

It is therefore, an object of the present invention to provide a wall construction, in particular for a storage unit for valuables, such as banknotes or other securities which, in the case of mechanical influences or thermal influences, activates an electronic circuit, and which is simple and which is lightweight and which is in addition as burglary-proof as possible.

Storage boxes which are manufactured with the aid of the wall construction, according to the invention, can be used in most of the cases in which money shall be transported to a different place in a safe and simple way. The wall construction can, of course, also be used in stationary storage units, such as a safe. The wall construction must then, of course, be adapted to the safe's purpose by adjusting the dimensions of the wall construction. Furthermore, such a storage unit, manufactured with the wall construction according to the present invention, can be equipped with a feeding unit such as an electric banknote feeder, something which will considerably simplify the feeding of banknotes. To secure withdrawal of the banknotes, a withdrawal unit, such as a removable lock cartridge, can be used.

The wall construction according to the present invention is characterised in that the construction comprises a intermediate thermal expansion mat and a intermediate layer, comprising contact means and a yielding system which, under counter- and pro influences from a spring force, is arranged to counteract and to bring about the completion or breakage of an electric circuit.

Preferred embodiments of the present invention are characterised in that the intermediate thermal expansion mat and the intermediate layer are arranged on each side of an electricity-conducting tier, respectively, and that the construction furthermore encompasses a reinforced plate arranged between the intermediate thermal mat and the outer wall. The construction comprises, from the inside to the outside, an inner wall, a layer comprising contact

means and a yielding system, an electricity-conducting tier such as a metal foil, a thermal mat, a reinforced plate and an outer wall.

The contact means comprise a number of opposite, outwardly extending contact arms, contact rails or contact cushions arranged to the outer sides of the inner wall and/or the electricity-conducting tier, respectively, and the spring system comprises a number of bolts arranged to the outer sides of the inner wall, with coil springs being arranged onto the bolts and arranged to force the electricity-conducting tier, the thermal mat and the reinforced plate against the outer wall.

Furthermore, the thermal mat comprises a graphite-based mineral fibre of a stabilised volume-expanding material with a thickness of between 1.5 mm and 4.0 mm, preferably between 1.8 mm and 3.0 mm, where the thermal mat has an expansion ratio of about 9:1 when heated to around 190°C and an expansion force of about 1.5 kg/cm<sup>2</sup> at around 400°C.

The present invention also relates to an use of a wall construction, according to the wall construction as mentioned previously according to the present invention, comprising of an outer wall and an inner wall between which are arranged a number of layers or tiers, where one of the tiers is comprised of an electricity-conducting material and contact means for activation of an electric circuit, whereby a number of wall constructions make up one side, a number of sides or all sides, preferably 6 sides, of a storage unit for valuables, particularly for securities such as banknotes, in that one or more of the wall constructions which are used to form the storage unit comprise a feeding device in an inlet opening, in the form of, for example, a banknote feeder, and a locking device in a withdrawal opening in the form of, for example, a removable locking cartridge. Use of the wall constructions, according to the present invention, is thereby carried out in that one or more of the wall constructions are put together to form a transportable storage unit, whereby

banknotes are fed into the unit before transportation, for safe transport from one place to another safe storage place or in that one or more of the wall constructions are put together to form a stationary storage unit for valuables,  
5 such as a safe or the like.

The invention shall now be described further with the aid of the enclosed drawings; in which,

Figure 1 shows a partial section of a wall construction according to the present invention.

10 Figure 2 shows as an example, a storage unit seen in perspective, composed of a number of wall constructions according to the invention.

As figure 1 shows, the wall construction comprises an outer wall 12, a plate 14, a mat 16, an electricity-conducting tier 18, a partially open layer 20 and an inner wall 22. The outer wall 12 is comprised of a metallic material. A reinforced wall 14 is arranged inside the outer wall. This reinforced wall 14 can comprise of acid-resistant steel with a thickness of about from 0.1 mm to 0.5 mm, preferably 0.2 mm to 0.3 mm. It is preferred that the plate 14 consists of a material which is strong and conducts heat well, and is also not too heavy. Other materials that provide similar characteristics to acid-resistant steel can of course be used also.

25 A thermal mat 16 is arranged inside the reinforced plate 14. This mat is comprised of a graphite-based mineral fibre of a stabilised volume-expanding material with a thickness of between 1.5 mm and 4.0 mm, preferably between 1.8 mm and 3.0 mm. The thermal mat has an expansion ratio 30 of about 9:1 when heated to around 190 °C, and an expansion force of around 1.5 kg/cm<sup>2</sup> at about 400 °C. Preferably, a thermal mat with the product designation TECHNOFIRE 60853 and manufactured by TECHNICAL FIBRE PRODUCT is used, but as mentioned, other mats or tiers with similar characteristics 35 can be used. An electricity-conducting tier 18 is arranged to the thermal mat. This tier 18 can, for example, be a thin metal foil. The tier 18, the mat 16 and the plate 14 are held together with the aid of, for example, glue.

Electricity-conducting contact means 24a,24b are arranged between the inner wall 22 and the electricity-conducting tier 18 which is secured to the expandable mat 16. The contact means can comprise a number of opposite 5 outwardly extending contact arms, contact rails or contact cushions, arranged to the outer sides of the inner wall 22 and/or the electricity-conducting layer 18, respectively. Shown in figure 1 is an example of contact cushions 24a and outwardly extending contact arms 24b. Only one of each is 10 shown in the drawing, but several of each type can, of course, be arranged in the wall construction, and/or other contact means can also be used.

When the wall construction 10 is put together, the springs 28a,28b, which are arranged onto the bolts 26a,26b, 15 will force the layers and/or tiers lying on the outside against the outer wall 12, which in turn can be secured to other outer walls in a number of other wall constructions to provide a storage unit. The bolts 26a,26b are not secured to the outer wall 12, only to the inner wall 22. 20 This results in the bolts extending out from the inner wall towards and/or to the outer wall. The spring system is arranged, under counter- and pro influences from a spring force, to counteract and to provide that the electric circuit is closed.

25 The electric circuit can be connected to different mechanisms which will destroy or make the securities useless when the circuit is closed. The mechanisms can of course be activated by the circuit being broken. The contact means will then be arranged so that they provide a 30 closed circuit all the time during «normal» use, but are broken by an external influence corresponding to the completion of the circuit. Mechanisms which are used, can, for example, be a firing mechanism which dyes the securities so that they are useless. A battery 36 is 35 connected to the mechanism 34, as shown in figure 2. This can be a passive electronic solution for the firing mechanism 34, which thereby does not use power from the in-

built battery 36. Such mechanisms are well known and will not be further described here.

It is important that the spring system is arranged to exert a sufficient spring force so that the outer layers, 5 i.e., the tier 18, mat 16 and the reinforced plate 14, are forced sufficiently against the outer wall 12, so that the mentioned layers do not move inwards and activate the electric circuit if a storage unit, composed of wall constructions according to the present invention, is 10 exposed to normal impacts and strikes. At the same time, the spring force must not be so large that the mentioned outer layers are not forced easily inwards to activate the electrical circuit at any attempts to break into the storage unit.

With attempts to drill through, or use an angle grinder on the wall construction, according to the present invention, the drill will push against the reinforced plate 14 and force this inwards so that the plate 14, the mat 16 and the foil 18 are moved towards the inner wall 22. This 15 result in that the electric tier 18 (the foil) comprising the contact means close the electric circuit. In addition, the production of heat from the drill or angle grinder 20 leads to the thermal mat 16 expanding and correspondingly pressing the electricity-conducting tier 18 inwards so that 25 the electric circuit is activated.

Attempts to burn a hole in the wall construction with the aid of, for example, a welding flame, will as mentioned above, lead to the thermal mat 16 expanding and forcing the electrical tier 18 inwards for activation of the electric 30 circuit.

With attempts to remove the outer wall 12, or bend the outer wall outwards, the reinforced plate 14, because of the spring force, will also move outwards, or glide along the outer wall 12 such that, corresponding to that 35 mentioned above, the contact means 24a,24b are closed or are broken, activating the electric circuit. The reinforced

plate 14 is not secured to the outer wall, but is forced against the outer wall 12 due to the force from the springs 28a, 28b.

The wall construction, according to the present  
5 invention, will, when composed of a number of corresponding  
wall constructions, provide a safe, transportable, or  
stationary storage box for storage of valuables, such as  
banknotes, ammunition, keys or the like.

Claims

1. Wall construction (10), particularly for a storage box for valuables such as securities, comprising of an outer wall (12) and an inner wall (22) in between which are arranged a number of layers or tiers, where one of the tiers is comprised of an electricity-conducting material, and contact means (24a,24b) for the activation of an electric circuit, characterised in that the construction (10) comprises an intermediate thermal expansion mat (16) and a intermediate layer (20) comprising contact means (24a,24b) and a spring system (28a,28b), which during counter- and pro influences from a spring force, are arranged to counteract and to ensure that the electric circuit is activated.

2. Wall construction according to claim 1, characterised in that the intermediate thermal expansion mat (16) and the intermediate layer (20) are arranged on each side of the electricity-conducting tier (18), respectively.

3. Wall construction according to claim 1, characterised in that the construction (10) furthermore includes a reinforced plate (14) comprised of a material which is heat-conducting and resistant to external strains, arranged between the intermediate thermal mat (16) and the outer wall (12).

4. Wall construction according to claim 3, characterised in that the construction (10) consists of, from the inside to the outside, an inner wall (22), a layer (20) comprising contact means (24a,24b) and a spring system (28a,28b), an electricity-conducting tier (18), a thermal expansion mat (16), a reinforced plate (14) and an outer wall (12).

35

5. Wall construction according to claim 4, characterised in that the contact means (24a,24b) comprise a number of opposite, outwardly extending contact arms, contact rails

or contact cushions, arranged to the outer sides of the inner wall (22) and/or the electricity-conducting tier (18), or the thermal mat (16), respectively.

- 5 6. Wall construction according to claim 4, characterised in that the spring system comprises a number of outwardly extending bolts (26a,26b) arranged to the outer sides of the inner wall (22), where the bolts (26a,26b) extend to or towards the outer wall (12), whereupon coil springs 10 (28a,28b) are arranged onto the bolts (26a,26b), arranged to force the electricity-conducting tier (18), the thermal mat (16) and the reinforced plate (14) against the outer wall (12).
- 15 7. Wall construction according to one of the preceding claims, characterised in that the thermal mat (16) comprises a graphite-based mineral fibre of a stabilised volume expanding material with a thickness of between 1.5 mm and 4.0 mm, preferably between 1.8 mm and 3.0 mm.
- 20 8. Wall construction according to claim 7, characterised in that the thermal mat (16) has an expansion ratio of about 9:1 when heated to around 190 °C, and an expansion force of about 1.5 kg/cm<sup>2</sup> at around 400 °C.
- 25 9. Wall construction according to one of the preceding claims, characterised in that the wall construction (10) comprises a feeding inlet (30) for valuables including a banknote feeder.
- 30 10. Wall construction according to one of the preceding claims, characterised in that the wall construction (10) comprises a withdrawal opening (32) including a lockable, removable plate.

11. Use of a wall construction (10) according to claims 1-10, whereby a number of the wall constructions (10) are combined to constitute a number of sides in a storage unit for valuables, particularly for securities such as  
5 banknotes, ammunition, keys and the like.
12. Use according to claim 11, in that one or more of the wall constructions (10) in the storage unit comprise a feeding device in an inlet opening, in the form of, for  
10 example, a banknote feeder, through which banknotes are fed, and a locking device in a withdrawal opening in the form of, for example, a removable locking cartridge through which banknotes are withdrawn.
- 15 13. Use according to claims 11-12, in that a number of wall constructions (10) form a transportable storage unit, whereby banknotes are fed into the unit before transportation, for safe transport from one place to another safe storage place.  
20
14. Use according to claim 11, in that a number of wall constructions (10) form a stationary storage unit for valuables, such as a safe and the like.
- 25 15. Use according to claim 11, in that a number of wall constructions (10) form a stationary storage unit for valuables, and that the storage unit is arranged as an integral part of an automat, such as a slot machine, payment automat, etc., or in connection with payment equipment such as ticketing systems for transportation, cinema, etc.  
30

1/2

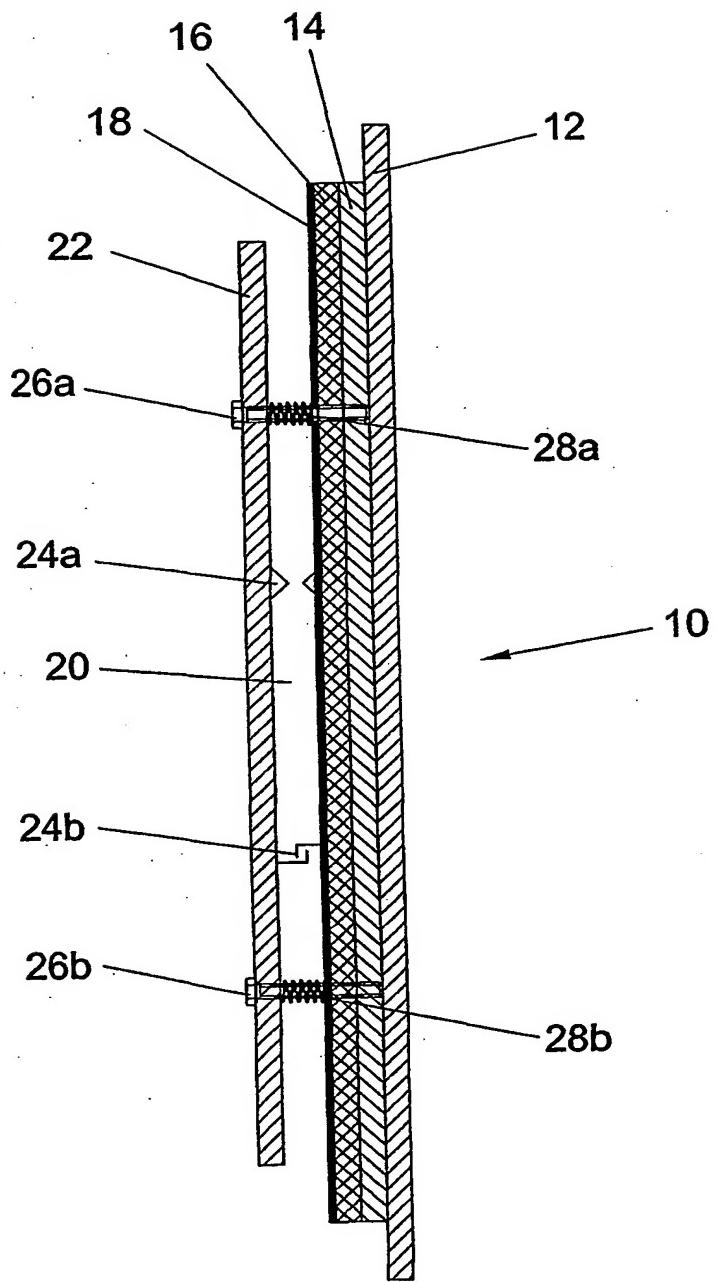


FIG. 1

2/2

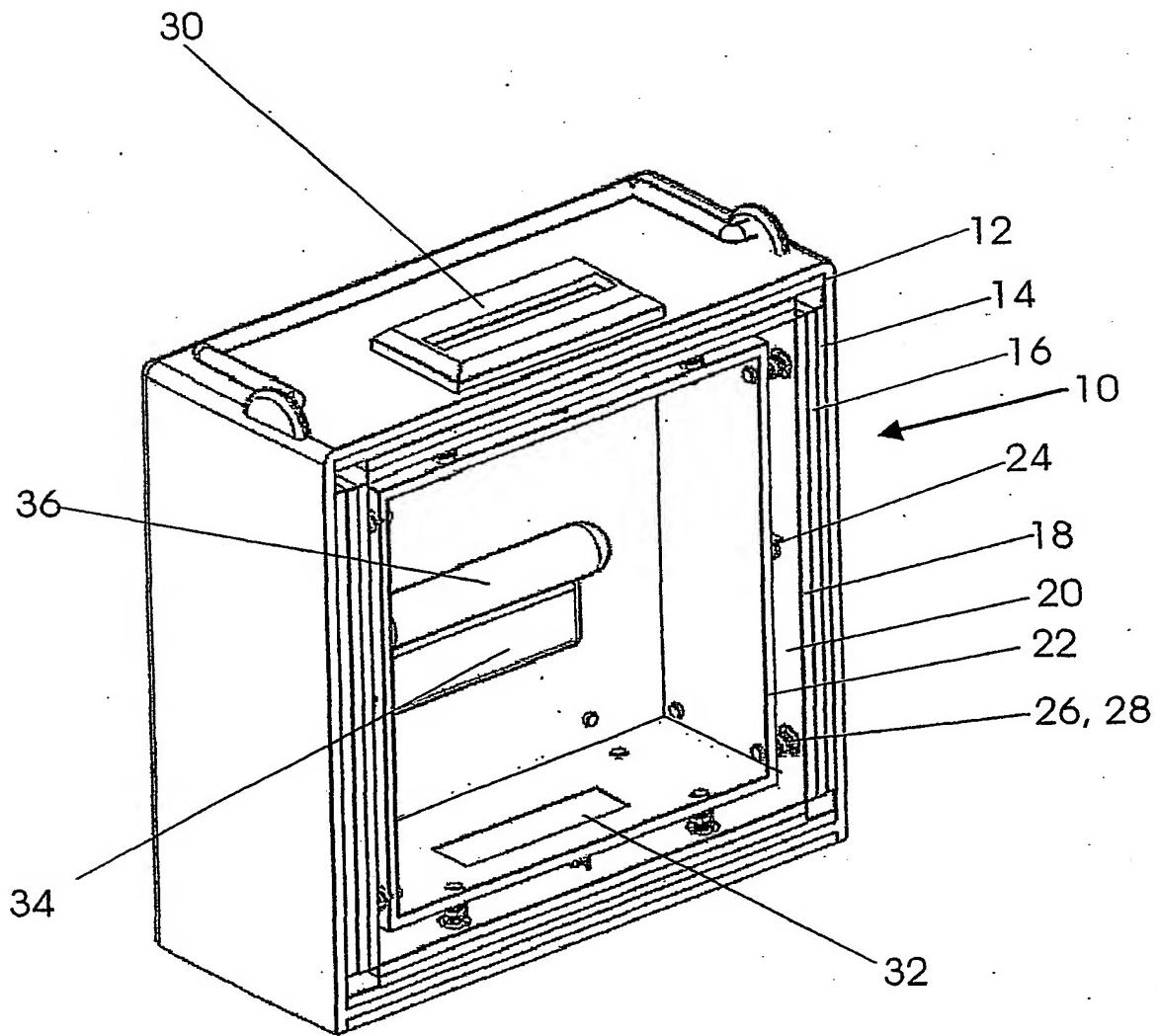


FIG. 2

## INTERNATIONAL SEARCH REPORT

International application No.

PCT/NO 01/00278

## A. CLASSIFICATION OF SUBJECT MATTER

**IPC7: E05G 1/10, E05G 1/14**

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

**IPC7: E05G**

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

**SE,DK,FI,NO classes as above**

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

**EPO-INTERNAL**

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	EP 0526972 A2 (W.L. GORE & ASSOCIATES (UK) LTD), 10 February 1993 (10.02.93) --	1-15
A	US 3851602 A (W. LAMPING), 3 December 1974 (03.12.74) -----	11-15

 Further documents are listed in the continuation of Box C. See patent family annex.

\* Special categories of cited documents:

- "A" document defining the general state of the art which is not considered to be of particular relevance
- "E" earlier application or patent but published on or after the international filing date
- "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- "O" document referring to an oral disclosure, use, exhibition or other means
- "P" document published prior to the international filing date but later than the priority date claimed

- "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
- "&" document member of the same patent family

Date of the actual completion of the international search

23 October 2001

Date of mailing of the international search report

01-11-2001

Name and mailing address of the ISA/  
Swedish Patent Office  
Box 5055, S-102 42 STOCKHOLM  
Facsimile No. + 46 8 666 02 86

Authorized officer

Christer Wendenius / MRO  
Telephone No. + 46 8 782 25 00

Form PCT/ISA/210 (second sheet) (July 1998)

**INTERNATIONAL SEARCH REPORT**  
Information on patent family members

01/10/01	International application No. <b>PCT/NO 01/00278</b>
----------	---

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP 0526972 A2	10/02/93	SE 0526972 T3 DE 69224567 D,T DK 526972 T ES 2114915 T GB 2256958 A,B GB 9113437 D GB 9211963 D JP 5201483 A NO 305817 B NO 922450 D US 5289785 A	17/09/98 28/09/98 16/06/98 23/12/92 00/00/00 00/00/00 10/08/93 26/07/99 00/00/00 01/03/94
US 3851602 A	03/12/74	AT 315019 B CH 551322 A DE 2202930 A,B FR 2127738 A GB 1375926 A	15/03/74 15/07/74 31/08/72 13/10/72 04/12/74